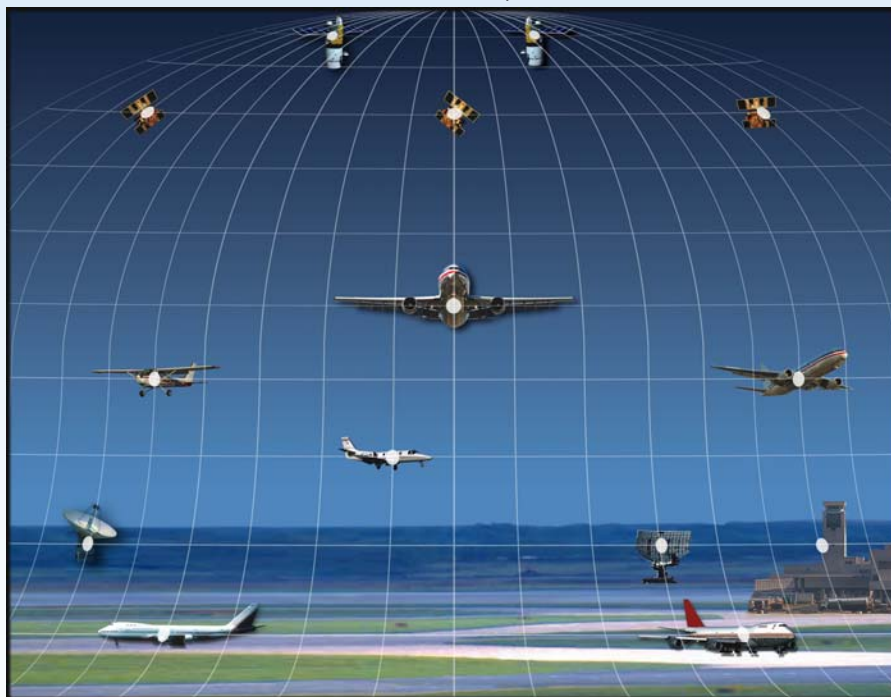


The Second ACAST Workshop

24-25 August 2004, Cleveland, Ohio



ACAST Project Review

Bob Kerczewski

ACAST Project Manager



ACAST Project Review



OUTLINE

Overview

A year ago...

FY 2004 Activities

Approach to ACAST – Subproject Prioritization

Milestones and Budget Overview

Work Breakdown Structure

Summary

BACKGROUND

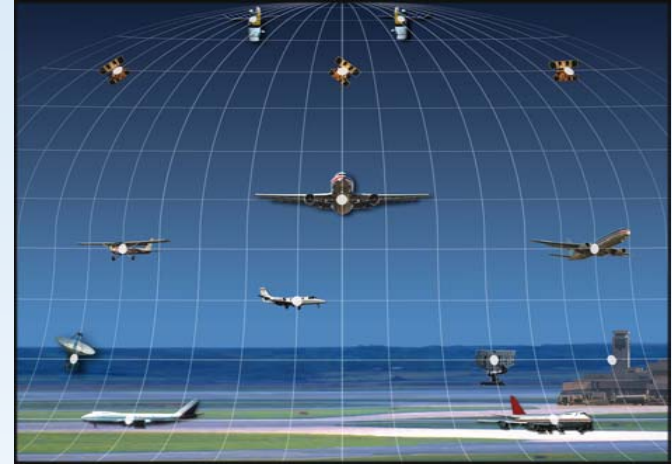
ACAST is a NASA research and development project focused on new communications, navigation and surveillance technologies to enable improved operations and increased capacity of the National Airspace System

ACAST focuses on solutions to near and mid-term problems and needs, while keeping in mind long-term NAS goals for advanced, information network-centric CNS infrastructure

ACAST aims for an R&D mix focused more on near/mid-term technologies, or “higher TRL” projects intended to provide technologies ready for the implementation process. (NASA’s TNAS initiative will focus on long-term, or “lower TRL” technologies).

Goal:

Initiate the transition of today's CNS systems into a high-performance network-centric digital infrastructure to support the future development of the National Airspace System



Objectives:

- Identify the transitional architecture to achieve the transformational high-performance integrated CNS (ICNS) system and define the global air/ground network architecture
- Develop efficient aviation spectrum utilization and support global spectrum allocations
- Enable efficient oceanic/remote operations through improved communications and surveillance
- Increase air-ground datalink performance and capacity for terminal and en-route operations
- Improve airport surface operations via an integrated wireless CNS network
- Develop high-payoff advanced CNS technologies

ACAST Project Review

ACAST Objectives at a Glance

Transitional Architecture and Global Air/Ground Network



Spectrum Efficiency and Advocacy



Efficient Oceanic/Remote Communications & Surveillance



Improved Air/Ground Communications



Airport Surface Network



High-Payoff CNS Technologies

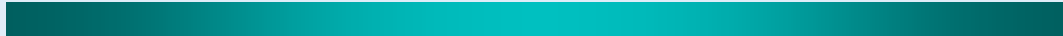


ACAST Project Planning Summary:

- NASA GRC participation in CNS Research and Development under several NASA Aeronautics Programs and Projects from 1997 to present
- Major analyses of CNS requirements, architecture approaches and technology gaps
- Four NASA-GRC sponsored Integrated CNS Technology Conference and Workshops (2001, 2002, 2003, 2004)
- NExTNAS-CNS Workshop – August 2003
- Technical Interchange Meetings with industry, FAA, academic and international aviation organizations
- Proposed Subprojects appropriate for SBT identified and validated at August 2003 workshop
- Project formulation during FY 2004, investigated and analyzed these subprojects, developed project plans and cost estimates
- Subprojects prioritized and planned against expected SBT resources in June, 2004

NASA GRC Projects Involving CNS Technology R & D

Advanced Communication for Air Traffic Management – AC/ATM (Under AATT)



Virtual Airspace Modeling and Simulation – VAMS



Weather Information Communications – WINCOMM



Smart Air Transportation System – SATS



Secure Aircraft System for Information Flow – SASIF



ACCESS 5



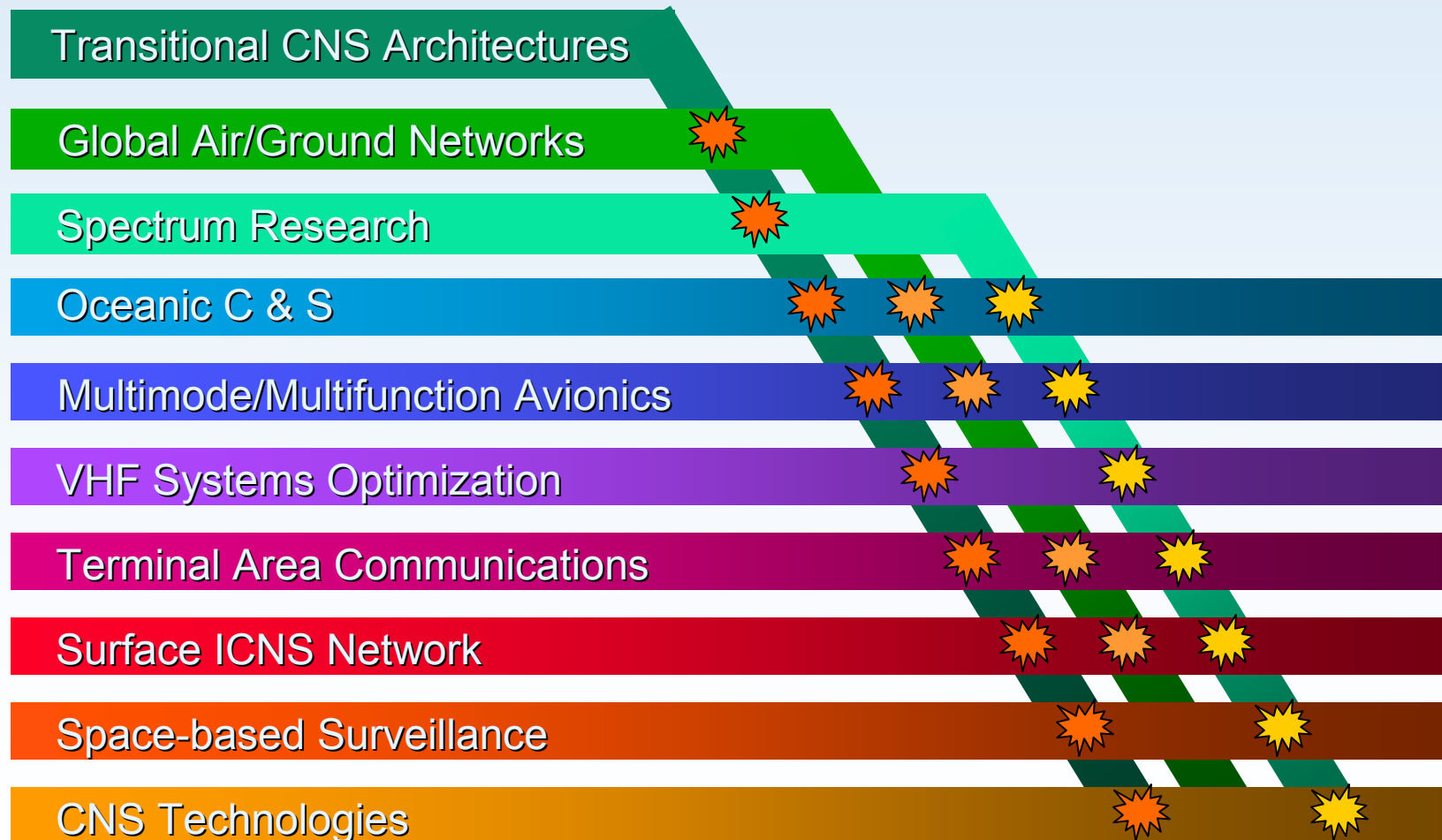
ACAST



1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2009

Fiscal Year

A year ago... These subproject areas were under consideration



ACAST Activities During Project Formulation (FY 2004)

- Identify initial subprojects for potential inclusion in SBT.
- Release external studies for MMDA, Surface ICNS Requirements, Global Network Requirements, and MLS Band Usage Feasibility.
- Future Communications Study – Technology Pre-screening contract started 24 May 2004.
- Additional external studies being prepared for spectrum, oceanic benefits analysis, and terminal area communications.
- Internal studies and analysis for all 10 proposed subprojects.
- Initial cost estimation exercises for all 10 subprojects.
- Subproject selection and resource allocation.
- Project Readiness Review successfully completed 9 July 2004
- Second ACAST Workshop – 24-25 August 2004

ACAST Project Review

Focus on Near/Mid-Term Solutions that Enable Long-Term Goals

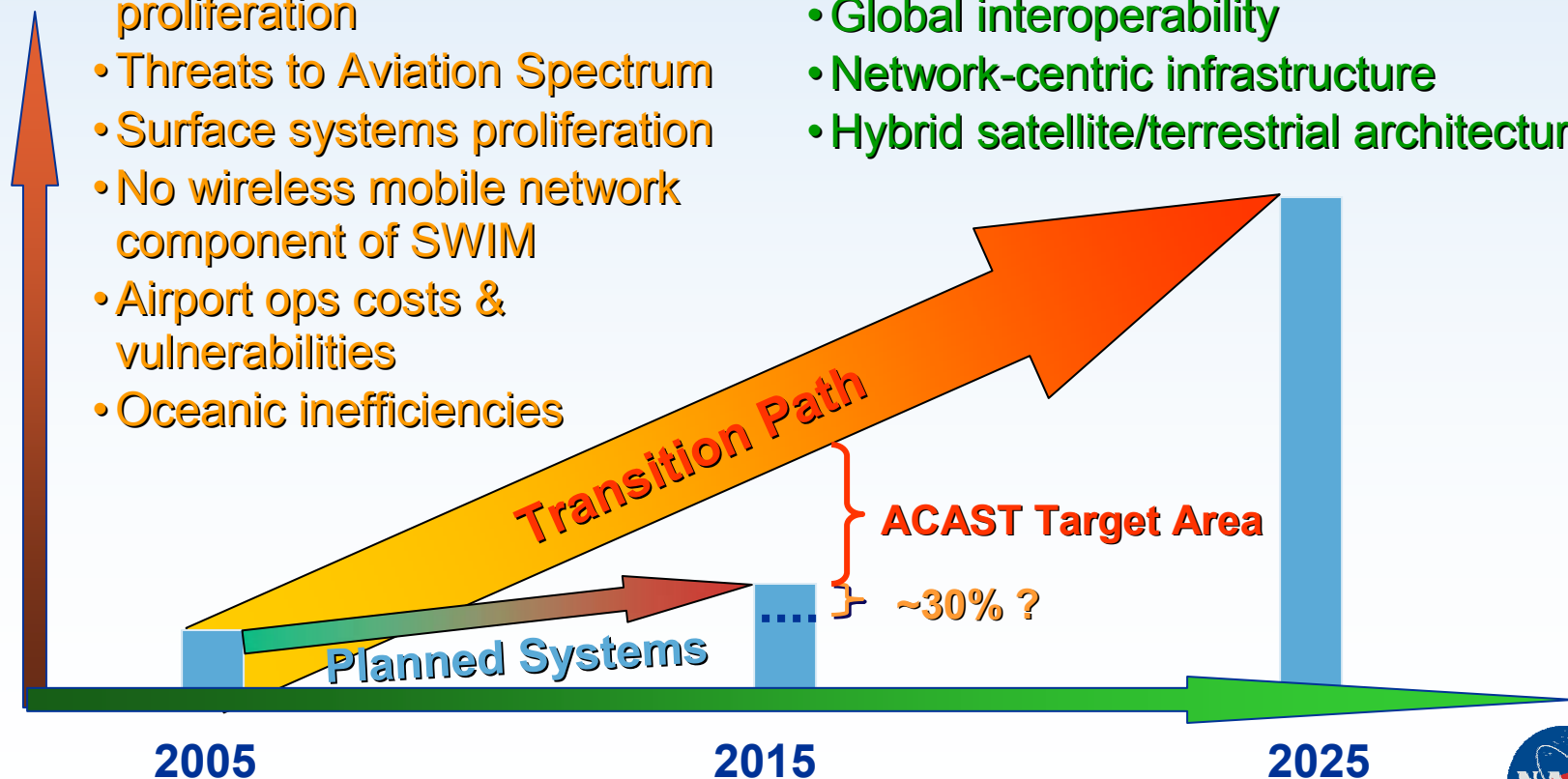
Key Near/Mid-term Issues

- Frequency congestion
- On-board avionics systems proliferation
- Threats to Aviation Spectrum
- Surface systems proliferation
- No wireless mobile network component of SWIM
- Airport ops costs & vulnerabilities
- Oceanic inefficiencies

Long-term Goals Enabled

- Transformational ConOps
- Increased integration of CNS systems
- Global interoperability
- Network-centric infrastructure
- Hybrid satellite/terrestrial architecture

Capability, Capacity, Performance





ACAST Project Review



Focus on Near/Mid-Term Solutions that Enable
Long-Term Goals

ACAST Research Area Prioritization

The highest priority subprojects:

- Multi-mode Multi-function Avionics

- Surface ICNS Network

- Oceanic/Remote Communications and Surveillance

- CNS Architectures, Networks, and Spectrum

With significant supporting work in:

- Terminal Area and En- Route Communications

- VHF Optimization

And low-TRL, high payoff R & D:

- CNS Technologies

4 Key Subprojects address the most parameters

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MMDA

Surface ICNS

Oceanic C & S

Long-term Goals Enabled

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Architecture, Networks and Spectrum involve all aspects as well.

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MMDA

Surface ICNS

Oceanic C & S

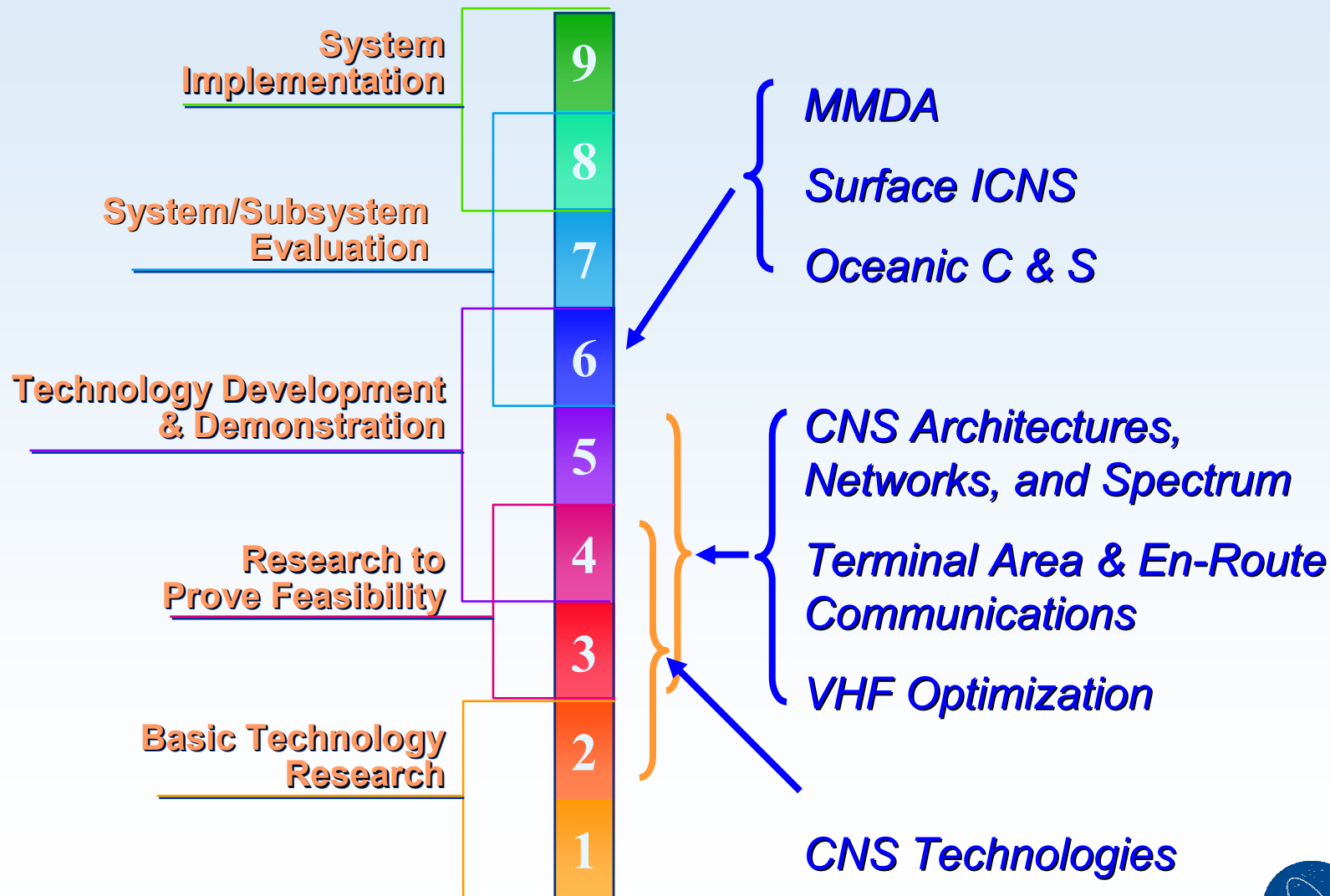
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Architecture, Networks and Spectrum involve all aspects as well.

ACAST Project Review

ACAST Subproject TRL Goals



ACAST Project Review

Milestones/Deliverables Schedule (approximate)

| Program | 2004 | | | | 2005 | | | | 2006 | | | | 2007 | | | | 2008 | | | | 2009 | | | | | | | | | | |
|---------------------------------------|----------|---|---|---|----------------------------------|--------------------------|---|---|--|--------------------|---|---|---|------------------------------------|----------|---|--------------------------------------|----------|----------------|----|--------------------------|-----|---------------------------|---|----------------------------|-------------------------------|--|--|-----------------------------------|--|--|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | | | | | | | |
| Project | PRR | | | | NAR | ★1 | | | Surface ICNS Concept | ★2 | | | IIR | Transitional CNS Architecture Defn | | | CNS Defn | MMDA Val | ★8 | | | ★9 | | | | | | | | | |
| | ◇ | | | | ◇ | Network-centric Concepts | | | ◇ | WRC-07 Preparation | | | ★3 | ◇ | GAN Defn | | | ★4 | MMDA Prototype | ★5 | ◇ | IIR | Surface ICNS Network Demo | | | SBT Minimum Success Milestone | | | | | |
| Integrated CNS Infrastructure | | | | | MLS-band Use Concept | | | | Network Standards Rqts | | | | WRC-07 Preparation | | | | Transitional Architecture | | | | CNS Defn | | | | Long-term Spectrum Roadmap | | | | | | |
| | Planning | | | | | | | | | | | | | | | | | | | | | | | | | | | | Network Protocols Standardization | | |
| | | | | | Network-Centric Concepts (GCNSS) | | | | Transitional Architecture Concept Defn | | | | Global Air/Ground Network Defn | | | | Long-term CNS Rqts | | | | GAN Validation | | | | | | | | | | |
| Surface and Terminal Area CNS Systems | | | | | MLS-band Characterization | | | | Surface ICNS Concept of Use | | | | Surface ICNS Ground Tests | | | | Surface ICNS Network Demo | | | | | | | | | | | | | | |
| | Planning | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | Terminal Area Rqts Defn | | | | Terminal Area Technology Assessment | | | | Terminal Area System Breadboard | | | | Terminal Area System Tech Evaluation | | | | | | | | | | | | | | |
| Satellite-Based CNS Systems | | | | | | | | | Oceanic C&S Concept Defn | | | | Oceanic Satcom C&S Feasibility Validation | | | | Oceanic C&S System Demo | | | | | | | | | | | | | | |
| | Planning | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | En-Route Requirements and Systems | | | | Small Satcom Terminal Prototype | | | | | | | | | | | | | | |
| Advanced CNS Technologies | | | | | Advanced CNS Technology Needs | | | | Antenna Tech Assessment | | | | VDL Characterization | | | | VHF Optimization Tech Eval. | | | | | | | | | | | | | | |
| | Planning | | | | | | | | | | | | | | | | | | | | | | | | MMDA Validation | | | | | | |
| | | | | | | | | | MMDA Architecture Defn | | | | Adv. Navigation Concepts for Landing Defn | | | | MMDA Prototype | | | | Advanced CNS Tech. Eval. | | | | | | | | | | |



Deliverables -
Project Milestones



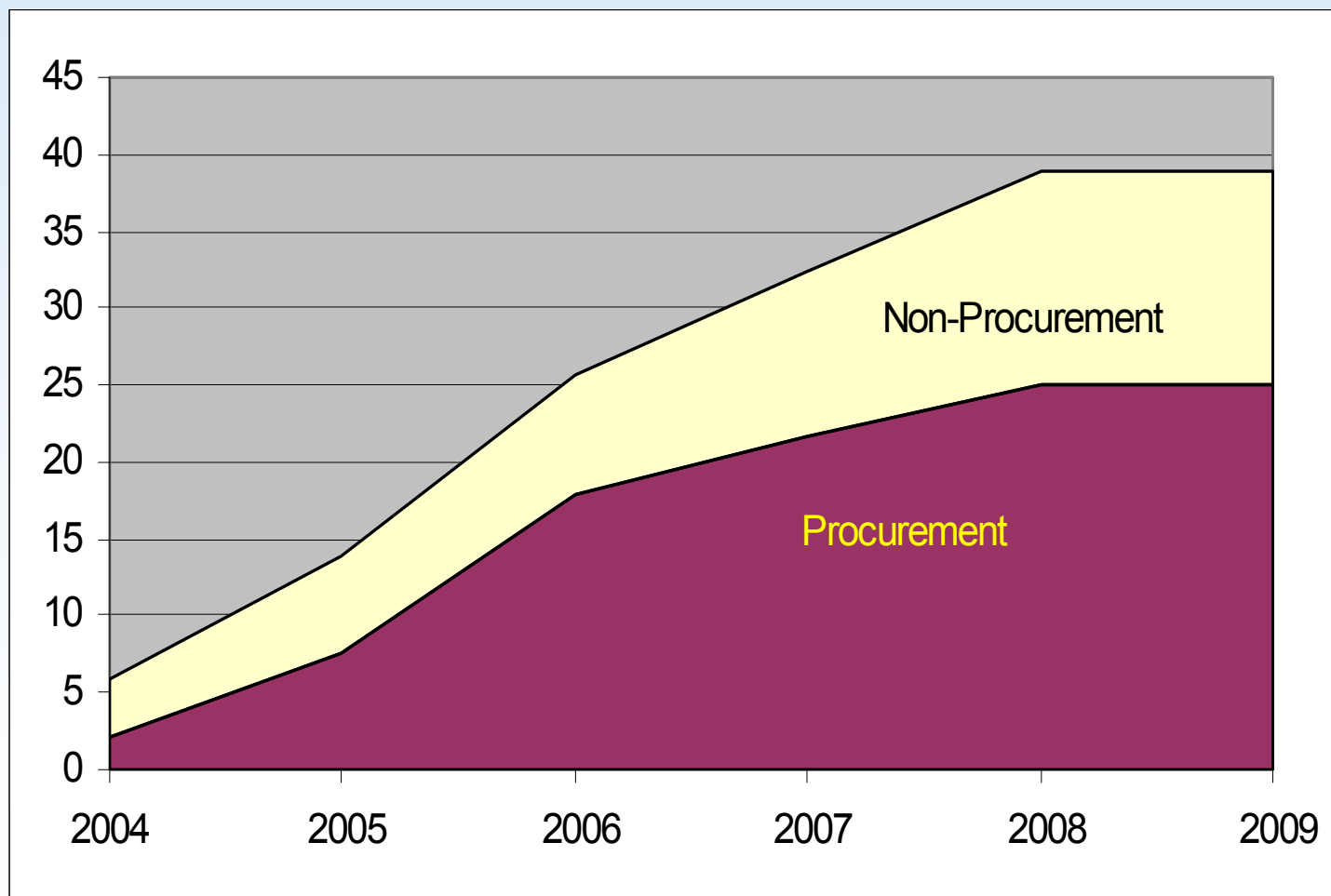
Sub Project
Milestones (Level 3)



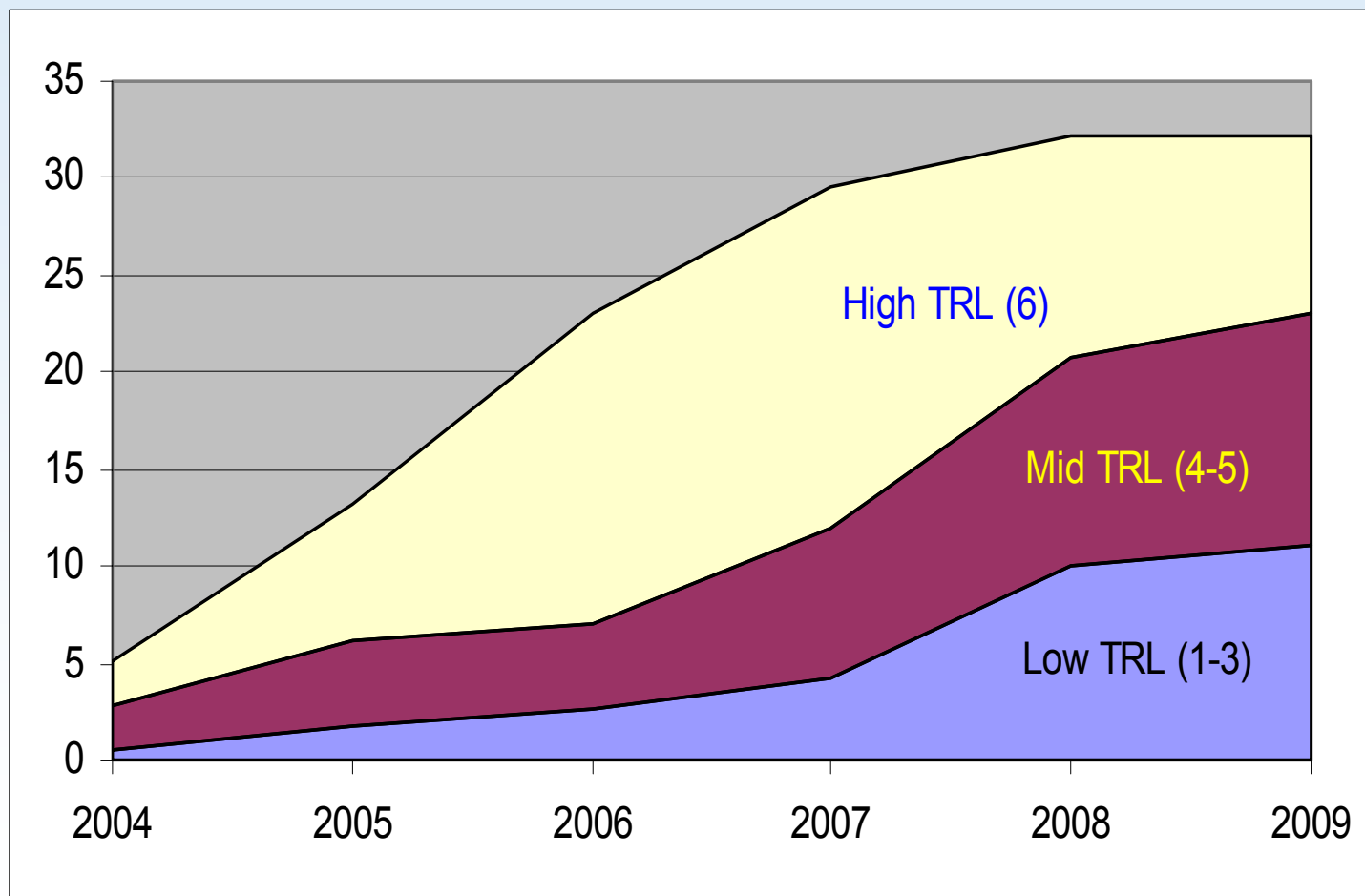
Major Project
Reviews

ACAST Project Review

ACAST Budget Overview

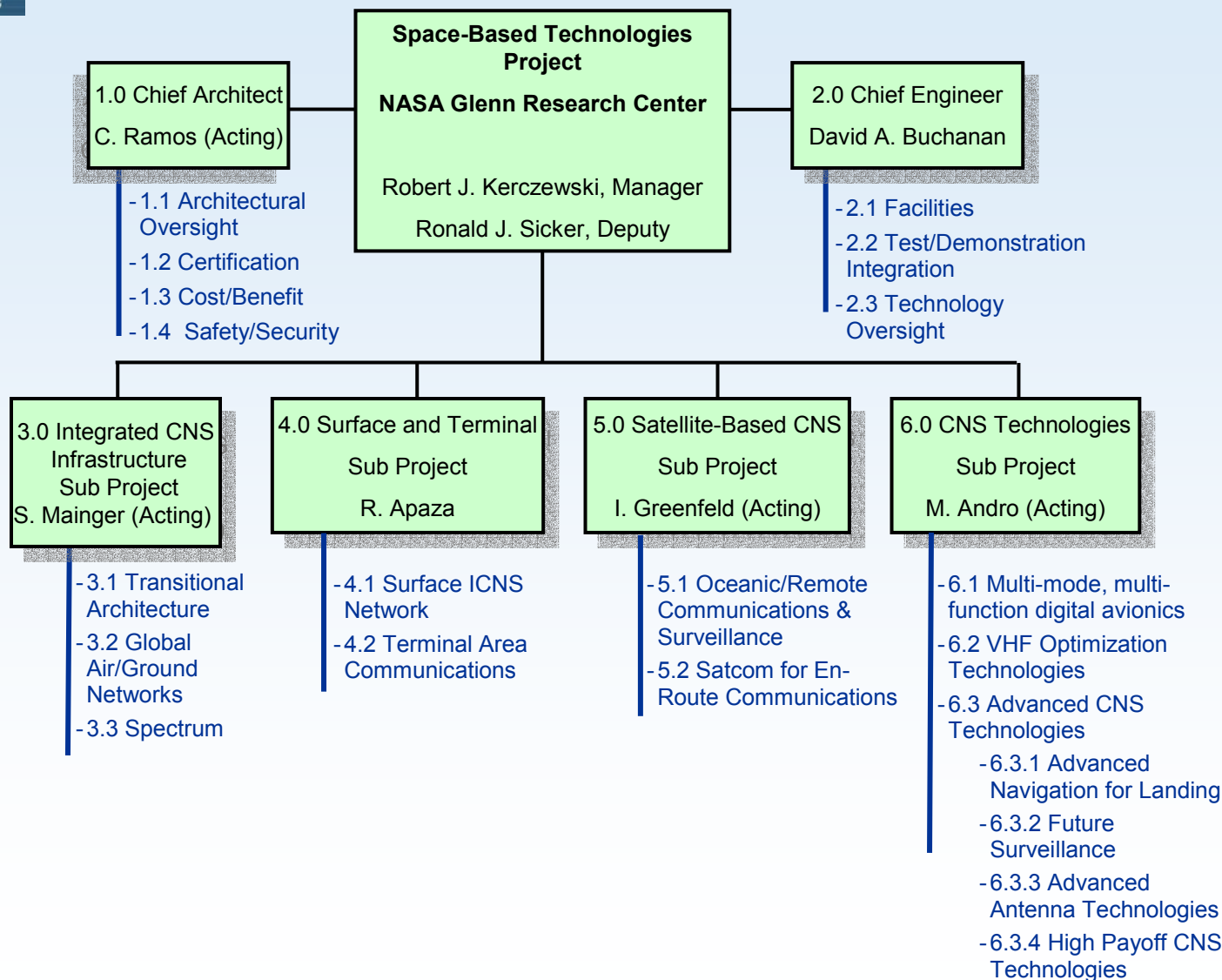


ACAST Budget vs. TRL (approximate)



ACAST Project Review

ACAST Work Breakdown Structure



SUMMARY:

- FY 2004 consisted of project formulation and planning
Planning, data gathering, study, investigation, education, cost estimation, discussions with aviation community, etc.
- High impact high-TRL technologies will receive emphasis in ACAST:
MMDA, Airport Surface Network, Oceanic C&S
- Cross-cutting areas are also important:
CNS Architectures, Network Technologies, Spectrum
- Mid-TRL and low-TRL technologies get later emphasis:
VHF Optimization is most important of these
- The budget distribution reflects these priorities